annual report

1990

ORTECH
INTERNATIONAL

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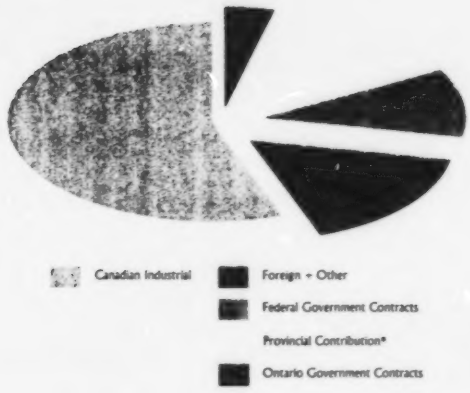
1990 At-a-Glance

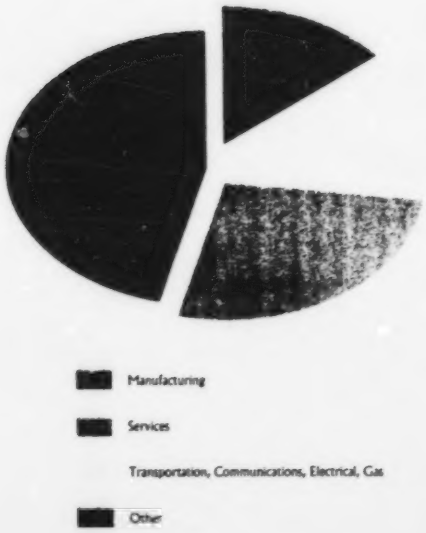
Employees 360 Revenue $29.2 million Industrial Clients 2,565

Revenue Sources

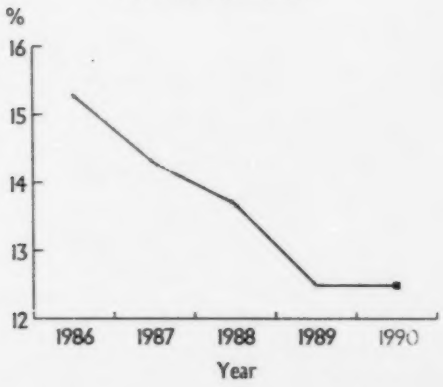


Industrial Revenue Geographical

Industrial Client Billings By Sector



*** Provincial Contribution % of Total Revenue**



A Message from the Chairman

Chairmanship of an organization such as ORTECH International presents its own set of rewards, not the least of which is the opportunity to be in contact with such an able group of people. The highly dedicated ORTECH team of scientists, engineers, technicians and technologists, as well as the support elements, comprise a powerful force which delivers timely, innovative answers to the thousands of Canadian and offshore clients they serve.

As I near the end of my chairmanship, I continue to be impressed by this team's ability to adapt its delivery to the needs of the rapidly changing world of technology. With a high degree of precision, ORTECH's professionals have aligned their services in a manner that positions ORTECH favourably to do what it does best – help their clients attain a competitive advantage.

I am confident that ORTECH International will continue to fulfill this mandate of technical service and that, in the years ahead, its client base of some 5,000 companies will continue to receive full value for their investments in innovation.

V. C. German

President's Report

Our people are the key to our future and investment in human resources is as important as investment in fixed assets. At ORTECH International, a major effort during 1990 was devoted to the laying of groundwork for that future. This included an overt demonstration that people matter to this company - that their contributions are recognized and their opinions heard.

As a beginning, we tried to coalesce the organization around common values. Through extensive, open sessions, scheduled in such a way that all employees participated, we determined that, at ORTECH, we believe in the fundamental importance of developing quality relationships between people. "People" in this context were further classified as not only our employees, but our customers, our suppliers, and our neighbours. These quality relationships, it was decided, should be founded on integrity, caring, respect, harmony, trust and fairness.

Next, we constructed a shared vision of the desired future. That vision addresses our approach to business issues, our attitudes toward our customers, how we work together, how we communicate with each other and our working environment.

With values established and our shared vision in place, we then developed a three-year strategic plan which would move ORTECH in the desired direction. The plan places a greater emphasis on increasing revenues by adding value to our work and on creating an even greater sense of urgency in our day-to-day operations. Also intrinsic to the plan is the development of communications networks and the nurturing of partnerships.

Actions have already begun in this area. Memoranda of understanding have been signed with Ontario and Federal government ministries and agencies. In addition, a Liaison Committee between ORTECH and the Ministry of Industry, Trade and Technology (MITT) operates as, among other things, an information conduit between the two entities. This, in turn, provides ORTECH with a greater understanding of Provincial government initiatives pertinent to the industrial community.

The Government of Ontario, through the MITT, provided ORTECH with funds to invest in new areas of technology and to maintain our comprehensive range of capabilities, primarily to serve the technical needs of medium and small sized businesses. On behalf of ORTECH, I wish to express our appreciation for this support; it is vital to our purpose of contributing to the development of the Province by helping to extend and diversify its industrial base.

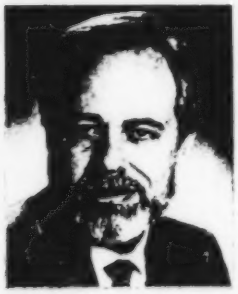
We have established and are solidifying relationships with both universities and Ontario centres of excellence as one step in our efforts to position ORTECH as the logical link between them and industry. We view neither the academic community nor the centres of excellence as competitors, but rather as technical partners, with each of us making a distinct yet essential contribution to the technical base so vital to Ontario industries.

Our neighbours in Sheridan Park Research Community and in the City of Mississauga are important to us and we have, for instance, become charter members of the newly-founded Mississauga High Tech Association.

We have renewed our commitment to look at the marketplace and be more responsive to our customers' needs. A product of this thinking is that, instead of offering a plethora of technologies in the hopes that one will fit, we are developing the ability to put together customized "packages" of needed services.

For instance, we recognized that in helping our customers address the popular "3Rs" (Reuse, Reduce, Recycle) approach to the environmental problem of waste management, ORTECH could draw upon the skill sets present in our materials, packaging, industrial design and building performance areas as well as in the traditional disciplines associated with chemical engineering.

Similarly, when an opportunity arose to technically assist a major automobile manufacturer with design qualification of a new product line, we not only employed the obvious group, our structural experts, but also the talents and unique equipment resident in our solar test facility to answer specific questions associated with the effects of the sun on certain components.



This flexibility to tailor our services to customer needs is, I believe, a special strength of ORTECH. By underscoring it, we can further assist Ontario and Canadian industry to become not only more competitive in the global marketplace, but also to meet foreign competition that penetrates the Canadian market.

All of these steps – the coalescing around common values – the building of a shared vision – the development of a strategic plan – the establishment of communications networks and the positioning of our services along the lines of perceived customer needs -- constitute the laying of groundwork for an ORTECH which, three years from now, will be in a position to invest more in people, in expanded facilities and in the development of new services. Moreover, it will be an ORTECH with a far-reaching reputation as a centre for delivering quality, for delivering customer satisfaction and as an excellent place to work.

Ross Lawford

Report on Operations

The line operation of ORTECH is divided into three groups, Environmental Technologies, Transportation Systems and Materials Technologies. The following Report on Operations is formatted according to those groups.

Environmental Technologies

The increasing concern of the general public about global and local environmental issues, and new environmental regulations stimulated additional private sector environmental activity throughout 1990.

Senior management in most companies became more aware of company and personal liabilities:

•the significant penalties for non-compliance with environmental regulations;

•the escalating cost of waste disposal forcing the need to reduce, re-use and recycle waste;

•the economic and environmental benefits of energy conservation and increased energy efficiency;

•the impact of good environmental management on corporate business activity and corporate image;

•and the opportunity for gaining competitive advantage by promoting 'green' products.

These concerns provided additional business opportunities for most areas within the Environmental Technologies Group, as well as other ORTECH units.

Significant growth occurred in the area of emission testing with several large programs, each in excess of $200,000, contributing to increased revenues and staff additions. Several emission inventories were completed consolidating our strong position in this area of expertise. The award of a major carbon dioxide inventory contract was the first which addresses the issue of global warming.

Several renewable analytical contracts for organic contaminants were awarded ORTECH by the Ontario Ministry of the Environment (MOE). The development program for continuous monitoring of organics in effluent streams proceeded with the successful completion of a demonstration project for a consortium of companies.

Illustrative of the energy-environment link were major governmental programs conducted on combustion systems, fuelled by both natural gas and oil, to evaluate both flue gas recirculation and selective catalytic reduction technologies for nitrous oxide reduction. New facilities for electric motor efficiency evaluation were commissioned and utilized, providing services to motor manufacturers, public utilities and government agencies.

In concert with units of the Transportation Systems Group, we expanded facilities for the evaluation of pre-production automotive vehicles which enables us to simulate indoors, under controlled conditions, any required outdoor tests. Moreover, this methodology provides for the delivery of accurate data in a shorter time and at reduced costs.

In the area of waste management, the Ontario Waste Exchange, operated by ORTECH and sponsored by MOE and the Ontario Waste Management Corporation (OWMC), handled more than 6,000 contacts in 1990. Other uses for 150 different wastes were identified and more than 20,000 tonnes of waste material were transferred from company to company.

A major study was conducted for a U.S. organization to determine the relationship between properties of gypsum, formed as a by-product of flue gas desulphurization, and the operating parameters of scrubbing systems, so that such by-products might be formed in the future with optimal properties for product manufacture.

Ontario has established targets of 25% and 50% diversion of waste from landfills by the years 1992 and 2000 respectively. More than half of all landfill waste comes from the industrial, commercial and institutional sector. In 1990, ORTECH commenced a comprehensive waste audit at a large hospital, with its main objective to recommend appropriate waste reduction practices for the hospital. Another outcome of this important study will be a manual for hospitals throughout North America to use as a guide for conducting their own audits.

Several pilot scale projects for recovery of valuable materials from wastes were conducted for members of the Canadian mineral resources industry. Also, alliances were formed in 1990 to bring new technology to ORTECH, such as plasma pyrometallurgy, which specifically address this opportunity.

Transportation Systems

The engineering business of ORTECH is now highly focussed on services to the transportation market. Specifically, the Transportation Systems Group provides services related to the development of highway and off-highway vehicles. This particular focus builds on existing strength and responds to the needs of the largest manufacturing industry sector in Ontario.

The Group provides services in three principal areas:

- Engine Technologies - ORTECH is responding to the need for low emission and high energy efficiency engine technologies which reduce the contribution of transportation vehicles to problems of urban air quality and global warming. This market has been selected as one in which ORTECH intends to build on its international reputation. It is a high growth area, particularly in alternative-fuelled engine technologies, being driven by increasingly stringent government legislation around the world.

- Structures and Dynamics - A major factor in the efficiency and competitiveness of a transportation vehicle, is the vehicle body structure. Proving that a new structure design will stand up to the loading and environmental conditions it will experience in its lifetime, has become a sophisticated, time consuming and expensive element of product development. ORTECH has established major test facilities and expertise which enables bus, truck and automobile manufacturers and their suppliers to reduce the time and cost of product validation of vehicle structures.

- Vehicle Systems - The application of advanced electrical and electronic technologies to transportation is a new

market thrust for ORTECH into a high growth field. Market segments currently being studied include diagnostics, hybrid electric vehicles, active suspensions, high energy ignition and intelligent vehicle highway systems.

Growth in the engine technology business was strong in 1990. A number of significant projects were completed for clients including:

- the first demonstration of diesel particulate trap technology in an urban transit bus in North America.
- the first demonstration of a dual fuel 6V92 (diesel and natural gas) two stroke engine in an urban transit bus in North America.
- implementation of a technical field evaluation of the world's first fully-integrated electronic fuel injection system for gaseous fuelled vehicles. The Gaseous Fuel Injection (GFI) system developed by ORTECH under contract to the Canadian Gas Association, has been fitted to 21 vehicles which are being evaluated by various user agencies across North America. The Ontario Ministries of Energy and Transportation are participants in this program, as are Energy, Mines and Resources Canada, several gas utilities and a major automobile manufacturer.

By year end, conditional worldwide license agreements had been signed with an Ontario manufacturer and a U.S. based marketing and distribution company for the manufacture and sale of the GFI system. These agreements provide for a major continuing research and development role for ORTECH. The program will produce significant benefits for Ontario in the years ahead including high technology manufacturing jobs in a new industry, continuing world class research and development, import replacement, contribution to solutions to environmental problems and increases to the provincial tax base.

Significant growth was achieved in the Structures and Dynamics unit, primarily as a result of the commissioning of a major integrated road simulator and environmental facility for full scale testing of automobile structures. Despite difficulties in bringing this facility on-line, we provided unique new services to the first client, a U.S. automobile manufacturer. In its first full year of operation, the new service generated revenues in excess of $850,000. ORTECH is now well positioned to capture a significant share of the body systems product validation market. This facility is particularly suited to work on vehicles using new materials in their structures and will be of value to Ontario based automotive suppliers as well as original automotive equipment manufacturers.

ORTECH also continued to provide structure product durability/validation services to major bus manufacturers. Projects were completed for clients in Ontario, other Canadian provinces, the United States and Europe.

Prospects for the Transportation Systems Group for 1991 and beyond are very good. Our ability to grow will be limited primarily by our ability to find and hire technically qualified people and to upgrade and expand facilities and equipment.

Materials Technologies

Expertise and capabilities in materials technologies have been basic strengths of ORTECH since the organization's inception 62 years ago. 1990 was a year of continued high activity levels and focussed evolution of the broadly-based Materials Technologies Group.

ORTECH's diverse materials capabilities are provided directly to an extensive range of both large and small industrial companies and government organizations - over 1,000 individual clients were served in 1990. A large percentage of these used ORTECH's services a number of times during the year and many have been ORTECH clients for some years. Also, in cooperative projects with ORTECH's other two technology groups, Environmental Technologies and Transportation Systems, ORTECH's materials expertise was used to create synergistic technology teams to respond to the complex needs of many of our clients.

Typical of the Materials Technologies Group's activities in 1990 was work performed by Polymer Technologies to develop a water-based intumescent coating and, for a small Ontario company, formulation and evaluation of a new plastisol for molded overshoes. Polymer Technologies' developmental activities focussed on opportunities in the medical products and pharmaceuticals industry and on our technologies for recycling plastics and rubber. Also, a state-of-the-art scanning electron microscope was added to our very successful microscopy laboratory allowing ORTECH to carry out a more elaborate range of failure analysis and evaluation projects in such diverse areas as electronics, plastics, and drug products.

Examples of typical Metals Technologies project activities, and their evolving focus on thin film coatings technology, included the development of a process by which nickel can be coated onto fibres and fibre weaves to create new high strength materials; the development of wear resistant, highly conductive thin film coatings for gravitometers; development of thin film barrier coatings to prevent the ingress of air and moisture, a critical issue for the packaging industry; and developmental work with magnetic ceramics for waveguide applications in high frequency satellite to satellite communications. Also, our experts played an important role in a task force to evaluate the effects of high voltage transmission lines located in close proximity to humans.

ORTECH's metals and mechanical testing facilities continued to provide for the needs of a large number of clients on issues such as tensile testing, corrosion, failure analysis and materials selection.

Building Performance Technology added infrared thermography to its range of capabilities to serve the construction and building products industries, leading the way for the acceptance of thermography as a highly effective tool for development and evaluation of high efficiency windows and other building system components and as a problem-detection mechanism in building structures.

Building Performance staff conducted numerous projects during the year including completion of on-site evaluation and testing at the legislature building at Queen's Park, Toronto, to assist the Ontario Ministry of Government Services in selecting the appropriate type and source of high efficiency windows for planned window upgrade and replacement in the stately old building.

ORTECH's Textiles Technology Laboratories continued with their usual very high activity in spite of down-sizing in Canada's carpet and other textile industries. We successfully added new major clients to replace lost business. This effort included ORTECH's appointment by Marks & Spencer (UK) as the recognized accredited testing lab in Canada for all textile products carried by the company in this country.

Similarly, the Fire & Flammability Technology laboratories completed a successful and busy 1990. In fact, 1990 was a record year for business and revenue for this unit and, with effective planning to evolve capabilities to meet changing demands and opportunities in fire and flammability, positioned the activity for future growth.

Corporate Programs

Corporately in 1990, ORTECH pursued initiatives begun in 1989, combined two functions to improve their relevance, and launched programs designed to secure a higher public profile.

The priority placed on the development of more positive relations with the Provincial and Federal governments in 1989, was vigorously pursued in 1990.

The Ontario government has been a supporter of ORTECH International since ORTECH's founding jointly by industry and government in 1928. In 1990, interaction increased significantly between the Ministry of Industry, Trade and Technology (MITT) and ORTECH following the signing of a first Memorandum of Understanding. Discussions on the role of ORTECH in Ontario's science and technology strategy are continuing and specific areas of technology development proposed by ORTECH are being reviewed. During the year, greater communication took place between ORTECH and MITT's domestic and international business consultants. This has led to the identification of technical needs of several firms for product development. These firms will be making use of ORTECH's capabilities. Exchanges of information for promotion of Ontario's science and technology interests have also taken place through meetings with the Ministries of Environment, Transportation and Intergovernmental Affairs.

On the Federal scene, consultations have been held with the National Research Council to identify areas of potential

collaboration on industrial R&D and with Industry, Science and Technology Canada on future potential industrial programs. ORTECH also met with the international science and technology counsellors of External Affairs and International Trade Canada and submitted a detailed response to Environment Canada on its Green Paper.

A Memorandum of Understanding was signed with CANMET – the technical arm of Energy, Mines and Resources Canada. Other Memoranda are being developed with the National Research Council and the Department of National Defence.

In international activities during the year, ORTECH was involved with specific proposals for joint research or with exchanges of information with representatives from Australia, Germany, New Zealand, Spain and the United Kingdom.

ORTECH's interests with the academic sector were enhanced through participation on committees to explore common areas of concern with Queen's University, Sheridan College, Trent University, the University of Guelph, the Ontario Centre for Materials Research, the Manufacturing Research Corporation of Ontario and the Canadian Institute for Advanced Research.

In 1990 ORTECH provided strong support for the founding of the Mississauga High Technology Association. Other association relationships spearheaded by our Industry-Government Programs Group were with the Association of Provincial Research Organizations, the Canadian Manufacturers' Association and the Consulting Engineers of Ontario. These associations also have objectives of improving the technological capabilities of Canadian industry regionally, provincially, nationally and internationally.

ORTECH, as a host organization, collaborates with the National Research Council in the delivery of NRC's Industrial Research Assistance Program (IRAP) in the metropolitan area between Peel and Durham regions. Activities of Industrial Technology Advisors (ITAs) continued at a high level with services to small and medium sized businesses. Advisors also provided technical assessments of industrial applications to the Technology Personnel Program of the Ontario government. The ORTECH/NRC IRAP group also accomplished a major achievement in 1990 with the launching of an advanced computerized network in Ontario to link with the national IRAP network. The Technical Information Service for Ontario ITAs to assist their industrial clients is continuing to show dramatic growth. A significant step in 1990 was the creation and filling of the position of Environmental Industrial Technology Advisor at ORTECH.

In 1990, an aggressive media relations campaign, pointed at widening our image, was initiated with a resulting 1,446 column inches of print in which ORTECH was either the principal subject or received mention. Equivalent advertising space in these publications, which represent a total circulation of 4,000,000, is estimated at $156,000.

Of note, three separate news features on ORTECH projects appeared in weekend editions of the Toronto Star, Canada's largest daily newspaper.

In an effort to broadcast the technical excellence of our clients, ORTECH created and made initial presentations of the Flavelle Awards for Technical Innovation. At a November ceremony attended by approximately 140 guests, Flavelle awards were presented to Inco Limited, Traqson Inc. and the Canadian Gas Association.

Early in the year it was decided to combine the services offered by our Technical Library and those of a small marketing information group (two units which were physically co-located) into the Business Resource Centre. This amalgamation underscores the need for both ORTECH management and our clients to integrate and apply technical and business information for successful decision-making whether it be in new technologies or in marketing strategies.

During 1990, the Business Resource Centre handled more than 4,000 telephone inquiries regarding technical issues from companies calling into our Client Access Line. Approximately eight percent were referred to outside firms or government agencies, while the remainder were responded to by appropriate ORTECH staff.

The Business Resource Centre also supports the information research needs of ORTECH's clients in the course of projects and programs with our operating groups. In addition, 130 companies and government agencies made a total of 300 visits to the Centre during 1990 to consult our directories, technical handbooks, journals and standards.

In 1990, we developed and implemented programs aimed at enhancing the quality of our services and creating as healthy and safe a work environment as possible. A Quality Management Program was instituted, which was designed to meet the increasingly-stringent requirements of clients and accrediting organizations alike.

Important aspects of the program were the production of a Quality Manual and the inception of internal Quality Audits to ensure that the high standards required are attained and maintained. In addition, an Occupational Health and Safety Program was formalized.

ORTECH Corporation Financial Statements

Management's Report

The consolidated financial statements of ORTECH Corporation and its subsidiary and all information in the annual report are the responsibility of management.

The financial statements have been prepared by management in accordance with generally accepted accounting principles and include amounts that are based on our best estimates and judgements.

Management has developed and maintains systems of internal accounting controls and procedures in order to provide reasonable assurance as to the reliability of the financial records and the safeguarding of assets. The Corporation's independent auditors, Peat Marwick Thorne, provide an objective, independent review of management's discharge of their responsibilities as they relate to the fairness of reported consolidated operating results and financial position of the Company in accordance with generally accepted accounting principles.

The Audit Committee of the Board reviews the consolidated financial statements with management and the external auditors prior to submission to the Board for approval, as well as the recommendations of the external auditors for improvements in internal controls and the action of management to implement such recommendations.

PRESIDENT
G.R. Lawford

VICE-PRESIDENT,
FINANCE
B.T. Porter

Auditors' Report

To the Board of Governors, ORTECH Corporation

We have audited the consolidated balance sheet of ORTECH Corporation as at December 31, 1990 and the consolidated statements of income and retained earnings, fixed asset contributions and cash flows for the year then ended. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these consolidated financial statements present fairly, in all material respects, the financial position of the Company as at December 31, 1990 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles.

Peat Marwick Thorne

Mississauga, Canada
February 1, 1991

Consolidated Balance Sheet ($000's)

Year ended December 31, 1990 with comparative figures for 1989

	1990	1989
ASSETS		
Current Assets:		
Accounts receivable	$ 6,813	$ 7,023
Prepaid expenses	567	513
	7,380	7,536
Deferred pension costs (note 2)	672	639
Deferred costs	330	–
Investments (note 3)	1,547	2,278
Fixed assets (note 4)	11,844	11,582
	$ 21,773	$ 22,035
LIABILITIES AND CAPITAL		
Current Liabilities:		
Bank indebtedness	$ 1,208	$ 1,826
Accounts payable and accrued liabilities	2,362	2,499
Amounts received in advance for research and projects	563	173
Deferred revenue	925	–
Current portion of long-term debt (note 5)	181	–
	5,239	4,498
Long-term debt (note 5)	796	–
Capital (note 6):		
Capital contributions	3,363	3,363
Fixed asset contributions	4,339	4,564
Retained earnings for acquisition of equipment and facilities	8,036	9,610
	15,738	17,537
	$ 21,773	$ 22,035

See accompanying notes to consolidated financial statements.

On behalf of the Board:

Governor

Governor

Consolidated Statement of Income and Retained Earnings ($000's)

Year ended December 31, 1990 with comparative figures for 1989

	1990	1989
Revenue:		
Professional services	$24,912	$ 25,096
Contributions from the Province of Ontario (note 7)	3,700	3,700
Investment income (net)	57	265
Royalty and other income	579	569
	29,248	29,630
Expenses:		
Salaries and benefits	17,023	15,763
Other costs of research	9,039	10,103
Depreciation expense less transfer from fixed asset contributions of $901 (1989 - $1,036)	1,663	1,431
General	3,097	2,820
	30,822	30,117
Loss for the year	(1,574)	(487)
Retained earnings, beginning of year	9,610	10,097
Retained earnings, end of year for acquisition of equipment and facilities	$ 8,036	$ 9,610

See accompanying notes to consolidated financial statements.

Consolidated Statement of Fixed Asset Contributions ($000's)

Year ended December 31, 1990 with comparative figures for 1989

	1990	1989
Fixed asset contributions, beginning of year	$ 4,564	$ 4,924
Fixed asset contributions received from the Province of Ontario (note 7)	676	676
	5,240	5,600
Transfer to income	901	1,036
Fixed asset contributions, end of year	$ 4,339	$ 4,564

See accompanying notes to consolidated financial statements.

Consolidated Statement of Cash Flows ($000's)

Year ended December 31, 1990 with comparative figures for 1989

	1990	1989
Cash provided by (used in):		
Operating:		
Loss for the year	$ (1,574)	$ (487)
Items not involving cash:		
Depreciation	1,663	1,431
Gain on sale of fixed assets	(59)	(5)
Gain on sale of investments	(96)	(23)
Deferred pension costs	(33)	(111)
	(99)	805
Net changes in working capital items:		
Accounts receivable	(120)	(299)
Prepaid expenses	(54)	(87)
Accounts payable and accrued liabilities	(137)	(199)
Amounts received in advance for research and other projects	390	(144)
Deferred revenue	925	–
	905	76
Financing:		
Fixed asset contributions	676	676
Long-term debt	977	–
	1,653	676
Investing:		
Proceeds from investments	827	(115)
Proceeds on sales of fixed assets	64	23
Additions to facilities	(21)	(131)
Acquisition of apparatus and instruments	(2,738)	(2,212)
Acquisition of other equipment	(72)	(169)
	(1,940)	(2,604)
Increase (decrease) in cash for the year	618	(1,852)
Cash (bank indebtedness), beginning of year	(1,826)	26
Bank indebtedness, end of year	$ (1,208)	$ (1,826)

See accompanying notes to consolidated financial statements.

Notes to Consolidated Financial Statements ($000's)

Year ended December 31, 1990

The Corporation was incorporated under the Research Foundation Act, 1944 and operates under the name ORTECH International.

1. SIGNIFICANT ACCOUNTING POLICIES:

a. **Principles of consolidation**:
The consolidated financial statements include the accounts of ORTECH Corporation and its wholly owned subsidiary, Ordco Technology Limited.

b. **Fixed assets and depreciation**:
Fixed assets are stated at cost less accumulated depreciation. Depreciation is provided on a straight-line basis at the following annual rates:

Asset	Rate
Buildings	3-1/3% and 5%
Apparatus and instruments	20% and 33-1/3%
Other equipment including assets under capital lease	6-2/3% to 33-1/3%

c. **Deferred costs**:
Deferred costs relate to specific projects where future revenue potential has been demonstrated. All other research and development costs were charged to earnings in the year incurred.

d. **Deferred revenue**:
Deferred revenue represents advances from the Province of Ontario for the funding of operations.

e. **Income recognition**:

Professional services:
Professional services revenue is recognized on the basis of the percentage of completion of the work at estimated fees or at per diem billing rates depending upon the contractual agreements. Estimated losses on contracts are recognized when they become known.

Gain on sale of investments:
Net gains realized on the sale of investments are included in investment income.

f. **Pension expense and obligation**:
The pension expense for the year includes adjustments for plan amendments, experience gains and losses and changes in assumptions which are being amortized on a straight-line basis over the expected average remaining service life of the employee group covered by the plan.

2. PENSION PLAN:
ORTECH Corporation has defined benefit pension plans which cover substantially all of its employees. Pension fund assets at December 31, 1990 were $13,542 (1989 - $13,854). The actuarial valuation as at December 31, 1990 indicated that the present value of accrued pension benefits attributed to services rendered to that date was $9,198 (1989 - $9,370). The difference between the funding contributions and the annual expense is reflected on the balance sheet in deferred pension costs.

3. INVESTMENTS:

	1990	1989
Short-term investments, at cost	$ 177	$ 538
Bonds and debentures, at amortized cost	1,051	1,147
Common and preferred stocks, at cost	319	593
	$ 1,547	$ 2,278
Quoted market value	$ 1,652	$ 2,629

4. FIXED ASSETS:

	1990			1989
	Cost	Accumulated Depreciation	Net Book Value	Net Book Value
Land	$ 597	$ -	$ 597	$ 597
Buildings	13,310	8,044	5,266	5,774
Apparatus and instruments	23,197	18,118	5,079	4,088
Other equipment	3,141	2,239	902	1,123
	$40,245	$28,401	$11,844	$11,582

Apparatus and instruments include equipment under capital leases of $1,092 (1989 - nil).
Accumulated amortization on these assets is $134 (1989 - nil).

5. LONG-TERM DEBT:

	1990	1989
Various capital lease obligations maturing in 1995. Fixed interest rates range from 12.85% to 13.95%. Monthly repayments of $25,000 include principal and interest.	$ 977	$ -
Current portion of long-term debt	181	-
	$ 796	$ -

Interest of $89 (1989 - nil) relating to capital lease obligations has been included in interest expense.

6. CAPITAL:
Capital consists of the following:

a. **Capital contributions**:
Capital contributions comprise the original capital sums donated by the Province of Ontario and industry, the income from which is being used to assist in meeting annual expenses in accordance with the terms of the contributions.

b. **Fixed asset contributions**:
Fixed asset contributions received from the Province of Ontario provide external resources for acquisition of fixed assets. These contributions are included in capital and are transferred to income over the estimated useful lives of the related assets.

7. CONTRIBUTIONS FROM THE PROVINCE OF ONTARIO:
In 1990 and 1989 ORTECH Corporation received from the Province of Ontario $3,700 for projects and operations and $676 for fixed asset additions.

Board of Governors, as at February 1, 1991

MEMBERS

CHAIRMAN
V.C. German
Corporate Director and former
President
Pilkington Glass Ltd.

VICE-CHAIRMAN
D.A. Chisholm
Corporate Director and
former
Executive Vice-President
Technology and Innovation
Northern Telecom
Canada Ltd.

VICE-CHAIRMAN
P.A. Lapp
President
Philip A. Lapp Ltd.

B. Caldwell
President
CleanWear Products

R.A. Ferchat
Chairman of the Board
AECL

D.M. Green
Chairman and
Chief Executive Officer
Tridon Limited

R. Halsall
President
Robert Halsall & Associates Ltd.

R.F. Hawkins
Corporate Director and former
President
Union Drawn Steel Company Ltd.

H. MacDiarmid
Corporate Director and former
President
Lumonics Inc.

D.C. MacGregor
Chairman of the Board and
Vice President, Medical Research
Corvita Corporation

W.J. McClean
Vice President
Manufacturing & Development
IBM Canada Ltd.

G.G. McKenzie
Corporate Director

E. Parliament
Corporate Secretary &
Director of Administration
Woodbridge Foam Corp.

C. Salomon
Senior Vice President
Marketing
Purolator Courier Ltd.

W.J. Schabereiter
Corporate Vice President
COSMA International

D.J. Watchorn
Partner
Davies, Ward & Beck

J. Wolfson
Assistant Deputy Minister
Ontario Ministry of Industry,
Trade & Technology

Committees

Executive Committee

V.C. German	Chairman
D.A. Chisholm	Vice-Chairman
P.A. Lapp	Vice-Chairman
Mrs. E. Parliament	Member

Finance/Audit Committee

Mrs. E. Parliament	Chairman
R.A. Ferchat	Member
V.C. German*	Member
R.F. Hawkins	Member
D.J. Watchorn	Member
G.R. Lawford	Member

Nominations/Human Resource Committee

R. Halsall	Chairman
D.A. Chisholm	Member
V.C. German*	Member
G.R. Lawford	Member

Strategy Commiteee

P.A. Lapp	Chairman
D.A. Chisholm	Member
V.C. German*	Member
W.J. McClean	Member
G.G. McKenzie	Member
W.J. Schabereiter	Member
G.R. Lawford	Member

Governance Committee

H. MacDiarmid	Chairman
Mrs. B. Caldwell	Member
V.C. German*	Member
G.G. McKenzie	Member
G.R. Lawford	Member

*ex-officio

Officers

V.C. German	Chairman
D.A. Chisholm	Vice-Chairman
P.A. Lapp	Vice-Chairman
G.R. Lawford	President
W.D. Heaslip	Vice-President Corporate Marketing and Materials Technologies
F.J. Hopton	Vice-President Environmental Technologies
R.W. Neville	Vice-President Transportation Systems
B.T. Porter	Vice-President Finance, Secretary-Treasurer

Executive Council (left to right):
F.J. Hopton, W.D. Heaslip, G.R. Lawford, B.T. Porter, R.W. Neville

1990 Patents and Publications

Patents

Patents were granted to ORTECH in 1990 for the following:

Enhanced in-situ electro reduction-oxidation of organic contaminants in groundwater systems.
K.L. Bellamy

Process for treatment of flyash. V.I. Lakshmanan, J. Melnbardis, R.A. Geisler, N.K. McQueen

Porous Carbon Pacemaker Electrode.
David C. MacGregor

Cardiovascular Prosthetic Devices and Implants with Porous Systems. David C. MacGregor

Publications

1335. Lakshmanan, V.I., Booth, C.A., Heinrich, G. and Andrews, P.R.
Alternative Additives in Mechanochemical Grinding of Industrial Mineral Fillers. *Advanced Materials - Application of Mineral and Metallurgical Processing Principles. Proceedings.* Littleton, Colorado, February 1990. pp. 71-76.

1336. Lakshmanan, V.I., Todd, I.A. and McQueen, N.
Recovery of Vanadium from Suncor Flyash - Flowsheet Development. *International Symposium on Ferrous and Non Ferrous Alloy Processes. CIM Proceedings.* Volume 21, 1990. pp. 157-164.

1337. Lakshmanan, V.I. and Tackaberry, P.D.
Review of the Application of Ion Exchange Technology for Gold Recovery. *Advances in Gold and Silver Processing.* Littleton, Colorado. 1990. pp. 257-263.

1338. Mackie, D. and Lakshmanan, V.I.
Developments in Continuous Vat Leaching. *Advances in Gold and Silver Processing.* Littleton, Colorado. 1990. pp. 143-150.

1339. Lakshmanan, V.I. (Editor)
Advanced Materials - Application of Mineral and Metallurgical Processing Principles. Littleton, Colorado: Society for MIning and Metallurgy Inc. 1990.

1340. Johnson, N.D. , Lane, D.A., Schroeder, W.H. and Strachan, W.M.H.
Airborne Organochlorine Measurements with the GAP Sampler. 32nd Conference on Great Lakes Research. Madison, Wisconsin. May 30-June 2, 1989.

1341. Johnson, N.D., Lane, D.A., Schroeder, W.H. and Strachan, W.M.
Measurements of Selected Organochlorine Compounds in Air near Ontario Lakes: Gas-Particle Relationships. *Long Range Transport of Pesticides.* Chapter 8. pp. 105-114. Chelsea, Michigan: Lewis Publishers Inc., 1990.

1442. Bellamy, Kevin L.
Potential Environmental Impacts of Composting. *Municipal Solid Waste: Maintaining 'Quality of Life' into the 1990s - Challenges, Costs & Opportunities.* Toronto, Ontario, January 24-25, 1990.

1443. Bellamy, Kevin L.
Industrial Compost: Paper Mill Sludge. *Compost & Composting: An Answer to Envirpnmental Pollution.* Toronto, Ontario. March 27-28, 1990.

1444. Bellamy, Kevin L.
Highland Creek, Scarborough, Ontario: A Reconstructive Evaluation of Bed Material Transport from Sedimentological Evidence. *Canadian Hydrology Symposium: 1990. Fluvial Sediments: Sources, Transfer, Fate & Effects.* Canada Centre for Inland Waters, Burlington, Ontario. October 30-November 1, 1990.

1445. Bellamy, K.L., De Lint, N., Predham, N.F. and Cline, R.A.
Agricultural Utilization of Paper Mill Sludge in the Niagara Region, Ontario. *13th Wastewater Conference, Proceedings.* Montreal, Quebec, November 14-16, 1990. pp. 65-83.

1446. Bellamy, Kevin L., de Lint, Nicole and Scholtz, Trevor.
Data Requirements in Evaluating and Modelling the Fate of Organic Chemicals in Soil. *1990 CIC Congress. Chemical Solutions for the Third Millennium. Abstracts.* Halifax, Nova Scotia, July 15-20, 1990. pp. 126.

1447. Zimcik, D.G. and Lassau, R.T.
Fabrication of Continuous Fibre Metal Matrix Composites by Plasma-Spraying Technique. *CSME Mechanical Engineering Forum 1990.* Toronto, Ontario, June 3-9, 1990.

1448. Ha, K. and Larocque, J.
Field Evaluation of a Diesel Particulate Trap System for a 6V-92TA Transit Bus Engine. *SAE International Congress and Exposition,* Detroit, Michigan, February 26-March 1, 1990.

1449. Lawson, A., Ha, K. and Carmichael, I.
Demonstration of Durable Retrofit Diesel Particulate Trap Systems on an Urban Bus and Class 8 Truck. *SAE International Congress and Exposition,* Detroit, Michigan, February 26-March 1, 1990.

1450. Hood, S.
The V-Grooved Electrode Spark Plug. *SAE Future Transportation Technology Conference.* San Diego, California, August 13-16, 1990.

1451. Lawson, A.; Carter, S.A.; Goetz, W.A. and Hood, S.
Performance and Emissions of an Electronic Fuel Injected Cummins L10 Natural Gas Engine. *NGV '90, 2nd International Conference and Exhibition,* Buenos Aires, Argentina, October 21-25, 1990.

1452. Welch, A.; Skinner, R. and Goetz, W.A.
Development of a Timed Port Injected 2-Cycle Natural Gas Engine. *NGV '90, 2nd International Conference and Exhibition,* Buenos Aires, Argentina, October 21-25, 1990.

Assistance to Outside Organizations

ORTECH's activities are not limited to performing technical tasks for our clients. More than 50 members of this organization, including officers, directors, managers, scientists and engineers, spent countless hours, many of them outside the normal working day, contributing to the overall advancement of technology through service on various boards and committees of the following 54 organizations during 1990:

Air and Waste Management Association
American Institute of Mining and Metallurgy
American Society for Testing and Materials
Association of Municipal Recycling Coordinators
Association of Provincial Research Organizations
Bioquality Steering Committee
Building Thermal Envelope Coordinating Council
Canadian Advanced Industrial Materials Forum
Canadian Association of Fisheries and Aquatic Services
Canadian Construction Research Board
Canadian General Standards Board
Canadian Home Builders Association
Canadian Institute of Mining and Metallurgy
Canadian Manufacturers' Association, Environmental Quality
Canadian Pulp and Paper Association
Canadian Research Management Association
Canadian Society for Professional Engineers
Canadian Standards Association
Canadian Window and Door Manufacturers
Conservation Council of Ontario
Durham College Food and Drug Technology
Environment Canada
Executive Women International

Federation of Societies for Coatings Technology
Financial Executives Institute
Gypsum Technical Committee
Health and Welfare Canada
Healthcare and Environment Network
Institute of Textile Science
Insulated Glass Manufactuers Association
International Organization for Standardization
Materials Research Society
MEDEC Waste Management Committee
National BIOMINET Committee
National Fenestration Rating Council
National Research Council of Canada
Occupational Health Chemists
Ontario Federation of Agriculture
Ontario Ministry of the Environment, Hazardous Waste Advisory Committee
Pollution Probe Foundation
Recycling Council of Ontario
Seneca College
Sheridan Park Association
Society of Mining Engineering
Society of Plastics Engineers
St. Clair River Remedial Action Plan - Binational Public Advisory Council
Standards Council of Canada
Technical Association of the Pulp and Paper Industry
The 5th International Conference on Indoor Air Quality and Climate
The Metallurgical Society
The Mississauga Hospital Foundation
Underwriters' Laboratories of Canada
University of Guelph

Full Time Staff, as at March 1, 1991

Richard Abbott
William Abel
Paul Amariutei
Jeffrey Arsenault

David Bailey
Sarvjit Baraich
Peter Barker
Chris Barringer
Syd Barton
Roy Basconcillo
Tony Bascus
Franz Bauer
Jerry Bauerle
Barbara Beatson
Elizabeth Bedwell
Judith Beetham
Cathy Bell
Kevin Bellamy
Chris Belore
Nancy Belson
James Bennett
Kelly Bingley
Malcolm Bingley
Gregory Black
Jacquie Bobak
Tony Bolus
Craig Booth
Ismay Bowen
Robert Bowen
Marco Bozzelli
Donna Bradley
Jack Brady
Rod Brooks
Sally Broughton
Adele Brown
Aileen Bruce
Lou Bruno
Peter Bruyn

Bruce Calder
Andrew Cameron
Hugh Campbell
Ken Cao
Omar Caporaletti
Suzanne Carlaw
Ian Carmichael
Steve Carter
Joe Caruso
Roger Chapman
John Christison
Lucio Cinelli
Pat Clutchey
Mary Cochrane
Neal Cockshutt
James Collins
James C. Collins
Rob Collins
Connie Colton
Terry Cooper
Rick Copley
Carm Coppolino
Lynn Coulter
Roger Cracknell
Jim Craigmile
Ron Cross
Rick Cziraki

Bejoy Das
Keith Davidson
Dwayne de Bruyne
Barb DeJean
Bob Delaat
Nicole DeLint
Joe Deshane
Vijay Deshpande
Lou Di Pasquale
Lorna Dias-D'Souza
Evelyn Dithurbide
Lothar Doehler
Jeffrey Dong
Douglas Doyle
Piotr Drozdz
Isobel Duncan
Thomas Duncan
Stephen Dunlop
Jack Dunn
Steven Dyck
Rod Dykes
Damjana Dzeko

Lyndia Edwards
Peter Edwards
Ghassan El-Tawil
Paul Elder
Robert Elliott
Denise Enta

Ed Faber
Bill Fairbrother
Mike Fancy
Joan Farr
Larry Fast
David Favarger
Mike Featherstone
Brenda Ferguson
John Flack
Bill Fossen
Bradley Fox
Norm Frenette
Fritz Frey

Karyn Gallant
Bob Gallinger
Ricardo Gardeazabal
Arlene Gauryletz
Paul Geisberger
Andy Germuska
Don Giannini
Nick Giannone
Malcolm Gibbon
Cyril Gibbons
Randy Gibbons
Bruno Gilbert
Sean Gilligan
Phil Girard
Cindy Glass
Wendel Goetz
Maynard Gorospe
Steve Goyeche
Chris Green
Peter Grinbergs

Kong Ha
David Hacker
Segundo Haduca
Mary Jane Hanley
Richard Hannaby
Susan Hannah
Andy Hansmann
Tim Harrison
Paul Haskins
Helen Hawkes
Steve Haynes
David Heaslip
Shabniz Hemraj
Tom Henderson
Bill Hickinbotham
Robert Hicks
Greg Hildebrand
Michael Hincks
Jeffrey Ho
Lawrence Ho
Tom Hodgins
Cee Holter
Marianne Holzner
Sandra Hood
Steve Hood
Fred Hopton
Wendy Horn
Art Horton
Susan Horton
Wanda Howe
Phil Humphrey
Paul Hyde

Vic Iafrate

John Jaremkow
Doug Johnson
Robert Johnson
Shelley Johnson
Bill Jones
Tom Judek

Maria Kappos
Laura Kee
Heather Kemp
Phil Kenny
Tom Kilp
Tom Kingry
Betty Kirby
Walter Klein
Michael Knappers
Cecylia Kneblewski
Henry Kneblewski
Susan Kormylo
Nick Kosmal
Goldie Kozelj
Karl Kozole
Michael Krynski
Elaine Kubota
Uwe Kuhn
Ed Kuley
Brett Kyle

Lucky Lakshmanan
Jim Larocque
Lise Larsen
Troy Lassau
Bob Laughlin
Frederick Law
Uri Law
Ross Lawford
Alex Lawson
Don LeBlanc
Omer LeBlanc
Richard Lederle
Shirley Leeson
Jacob Leidner

Dave Leslar
Andrew Leung
Susan Levesque
Al Lewis
Scott Librock
Jane Lindsay
Deming Liu
Lou Lombardi
Bill Longley
John Lopatynski
Dianne Lougheed
Lydia Luckevich
Peter Lui
Doug Lyons

Darryl MacDonald
Anne MacDonald
Bill MacDonald
Terry Mah
Bibi Mahadeo
Al Major
Walter Malis
Tak Ming Man
Brian Manicom
Aldo Marascio
Janice Martin
Geza Matolcsy
Fatima Matos
Gwyn Matthews
Peter Mayer
Nancy McDonald
Kendra McIntyre
Stephen McLay
Irene McMullen
John McNeill
Jack Melnbardis
Manuel Mendoza
Lora Micelli
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Mario Moniz
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Sharon Mugford
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Gordon Mutch
Bailey Mylleville

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Sheila Newman
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Vern Nielsen
Ron Nuttley

Brian O'Connor
Randi O'Driscoll
Frank O'Hara
Lorna O'Hearn
Jiri Opletal
David Ord

Neil Parent
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Glen Pelling
Jan Petley
Peter Piersol
Vincey Pisani
Robert Polyoka
Bruce Porter
Nada Poturica
Bill Prendergast
Joyce Price
John Purse
Joe Pust

Eduardo Quijano

Rick Raininger
Ofelia Ramos
Sue Reid
Maria Reisinger
Doug Renton
Lincoln Reynolds
Jim Riendeau
Marc Rishea
Michael Rix
Michael Robertson
Dave Robinson
Wayne Robinson
Neil Roelfsema
Pat Ross Smith
Llewellyn Rowlands
Ryan Rybchuk

Abdool Satar
John Savage
Jack Schaeffer
Trevor Scholtz
Ursula Scholz
Harry Schulz
Maureen Schulz
Peter Schuster
Madelene Searson
Brian Sellars
Cathe Shaw
Mike Shaw
Eric Sheffield
Jim Shields
Eric Simmons
Andrew Sinclair
Karen Skinner
Ray Skinner
Brad Smith
Duncan Smith
Ian Smith
Walter Sowa
Rick Stewart
Richard Stothers
Liz Strain
Hubert Stromberger
Mehboob Sumar
Mark Szumigaj

Patrick Tackaberry
Don Taylor
Jane Templeman
Jackie Terry
Gordon Thomas
Steve Thorndyke
Dave Thurston
Iain Todd
Joanne Toms
Peter Top
Pauline Town
Virginia Trimble
Esther Tsoi
John Tyler
Ed Tyrcz

Hank Van Bakel
Sharon Van Reenan
Gerald Van Wyngaarden
Linda Varangu
Renato Veerasammy
Marisa Viani
Glenn Vicevic
John Voges

Jamie Walker
Greg Wallace
Donald Webb
Walter Webb
Carl Wei
Olga Wells
Larry West
Kevin White
Darryl Wilde
Rick Williams
Bryan Williamson
Pat Wilson
Bill Winnitoy
Stasia Wirzman
Joanne Wojna

Wieslaw Zaton
Ron Zeeman
Gael Zillman